



MineSafe

Western Australia



A different perspective
on risk management



Ventilation training
and skills page 8

Finding refuge
underground page 16



Department of Consumer
and Employment Protection
Government of Western Australia

Vol. 15, No. 1
March 2006

Resources Safety



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ISSN 1832-4762

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Cover photo courtesy of Michael Lovitt

In this issue

Welcome to the first issue of *MineSafe* for 2006.

On the facing page you will find an article from Martin Knee, the State Mining Engineer, explaining the legal structure of modern safety legislation. This information is useful for understanding Western Australia's mines safety and inspection legislation, and is also timely because a draft package of updated Dangerous Goods Safety legislation will be released for public comment at the end of this month. The package includes regulations, codes of practice and guidelines to support the *Dangerous Goods Safety Act 2004*. More information on obtaining the package is available on the back page of this issue of *MineSafe*.

Following on from the article on ventilation in Western Australian mines that appeared in the December 2005 issue of *MineSafe*, on page 8 you will find an article on ventilation training and skills. This article again highlights how safety problems can arise when there is a skills shortage and, consequently, a lack of specialist safety experience and training among mine workers.

Most readers would be aware of two recent successful mine rescues following underground fires, in Tasmania and here in Western Australia. The article on page 16 reiterates the importance of installing and maintaining refuge chambers in underground mines, and reminds those in the industry that Resources Safety has a guideline on refuge chambers to assist in ensuring that mines are properly equipped. There is no doubt that the availability of refuge chambers in the St Ives Leviathan mine helped preserve the lives of the nine workers who were trapped underground by fire. I must also commend the efforts of everyone involved in the rescue of those workers — a fine example to the rest of us of the importance of having trained and dedicated emergency response teams on site, and an endorsement of the annual mines rescue competitions.

Safety Bulletins 75 and 76 (reproduced on pages 20–24) were released following recent incidents involving explosives in mining operations. Explosives play an important and prominent role in mining, and although most of us recognise the dangers they can pose, you can become complacent when you work with them on a regular basis. These bulletins should remind people working with or near explosives that appropriate safe work practices must always be followed. If you do the wrong thing, the nature of explosives devices means that it's only a matter of time before an incident will occur.

Malcolm Russell
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From the State Mining Engineer



Codes of practice — a good defence

There has been much debate about the replacement of prescriptive regulation by guidance material, including approved codes of practice. Often, there is a lack of knowledge about what the various non-statutory elements of a regulatory system are all about and what their individual and collective legal effects may be.

Essentially, following a code of practice provides a means of defence against any allegation that something required under an Act has not been done to an appropriate standard. It is different from a guideline, but is still not necessarily mandatory under all circumstances. Broadly, if the Act says 'you must do good things so far as is practicable', a guideline says, 'here are some good things you might want to consider doing', while a code of practice says, 'here is a list of things that are deemed to be good and if you do them this way, you will be deemed to have done the good things required by the Act — if you do something else, you may still be doing good things, but it is up to you to prove that the things you have done are good'.

In Western Australia, the *Mines Safety and Inspection Act 1994* (the Act) sets objectives to promote and improve occupational safety and health in mining operations. The Act sets out broad duties and is supported by more detailed requirements in the *Mines Safety and Inspection Regulations 1995* (the regulations). A range of guidance material, including codes of practice, further supports the legislation. The legislative framework is set out below.

Legislative framework

Mines Safety and Inspection Act 1994

Major provisions of the Act are:

- the general duties;
- management of mines;
- enforcement of Act and regulations;

- resolution of issues;
- safety and health representatives and committees; and
- accident and incident reporting requirements.

The Act is supported by:

Mines Safety and Inspection Regulations 1995

The regulations set minimum requirements for specific hazards and work practices, including reference to National Standards developed by the Australian Safety and Compensation Council (formerly National Occupational Safety and Health Commission), and Australian Standards developed by Standards Australia.

The Act and regulations are also supported by:

Guidance material

Guidance material includes:

- codes of practice approved for Western Australian mines in accordance with section 93 of the Act;

- guidelines approved by the Mining Industry Advisory Committee;
- national codes of practice and National Standards developed by the Australian Safety and Compensation Council; and
- Australian Standards developed by Standards Australia.

Guidance material also includes explanatory documents that provide more detailed information on the requirements of the legislation.

Codes of practice contain practical information on how to comply with legislative requirements. They describe safe work practices that can be used to reduce the risk of work-related injury and disease. Codes of practice may also contain explanatory information.

The work practices included in a code of practice may not represent the only acceptable means of achieving the standard to which the code refers. There may be other ways of setting up a safe system of work and, providing the risk of injury or disease is reduced

Continued on page 4...

The legal structure of modern safety legislation

An Act, distilled to its very basics, says that at work:

- nothing you do, or fail to do, should endanger your employees or others affected by your actions.

Modern 'enabling' regulations would extend this by saying, in essence:

- you must be safe in areas X, Y and Z — see the approved codes of practice for details.

An approved code of practice would then state:

- Although this is not law, you should follow these ideals. We cannot be too specific about particular or individual applications in case it is not the best advice for a particular circumstance. If you choose to do things differently it will be 'up to the Courts to decide' if you did it properly, and this approved code of practice will be taken as the standard. However, where we are specific, there is no room for flexibility.

...from page 3

as far as practicable, the alternatives should be acceptable.

The legal status of codes of practice

The provision for approval of codes of practice is made in section 93(1) of the Act:

93. (1) *The Minister may approve a code of practice which has been considered by the Mining Industry Advisory Committee, for the purpose of providing practical guidance to employers, self employed persons and employees and other persons on*

whom a duty of care is imposed under this Act.

It is not necessary for a government agency to prepare a code of practice — it can be prepared by any appropriate body with the necessary knowledge and experience of what may be required, including industry bodies or unions.

Section 93 sets out the processes associated with the approval and revision of codes of practice, and the status of approved codes of practice in relation to legal proceedings. The following points are included:

- a person is not liable to any civil or criminal proceedings simply because of non-compliance with a code of practice; and

- where it is alleged that a person has contravened a provision of the Act or regulations, the information in a code of practice may be used as evidence to show there is a practicable means of reducing the risk of work-related injury or disease.

However, demonstration that the person has complied with the Act or regulations by some other means would be a satisfactory defence.

Codes of practice may not provide exact solutions to occupational safety and health problems in all workplaces in the industry, but following the practical guidance in an approved code of practice should help to reduce the risk of serious injury or death.

Introducing the Minister

responsible for Resources Safety



The Hon John Bowler JP MLA, now the Minister responsible for Resources Safety

The Hon John Bowler JP MLA is the Minister for Employment Protection, which includes the Resources Safety Division of the Department of Consumer and Employment Protection. He was elected to the

Western Australian Parliament on 9 February, 2001 as the Labor Member for Eyre. Prior to this he was the founding editor of the *Golden Mail* newspaper (1997–2001).

Under the 2003 redistribution of Western Australia's electorate boundaries, the seat of Eyre was renamed Murchison–Eyre and doubled in size to more than 1.23 million square kilometres, stretching from the Pilbara to the Northern Territory and South Australian borders, and to the Gascoyne, Yilgarn and Goldfields.

John Bowler has been a Member of the Economics and Industry Standing Committee since 30 May 2005.

In 2002, he chaired an inquiry to identify strategies for increasing resource exploration levels. The report of Western Australia's Ministerial Inquiry into Greenfields Exploration in Western Australia was subsequently released in 2003.

Following the re-election of the Labor Government in February 2005,

John was appointed as Minister for Local Government and Regional Development, Land Information, Goldfields–Esperance and Great Southern. He added the Sport and Recreation portfolio to his responsibilities in November 2005.

The cabinet reshuffle in February 2006 saw him promoted to the portfolios of: Minister for Resources and Assisting the Minister for State Development; Employment Protection; and Goldfields–Esperance and Great Southern.

John was born in Kalgoorlie in 1949. He is married with five sons. As a keen player and coach of basketball, John was also chairman from 2001 to 2005 of the Goldfields Giants, who compete in the State Basketball League.

Educated at South Kalgoorlie Primary School and Eastern Goldfields Senior High School, John undertook a cadetship at the *Kalgoorlie Miner* and in 1980 joined the ABC in Kalgoorlie as a journalist.

About WorkSafe

Resources Safety is a division within the Department of Consumer and Employment Protection (DOCEP). This article is the first in a series on the other DOCEP divisions.

WorkSafe Western Australia (now the WorkSafe Division of DOCEP) administers Western Australia's *Occupational Safety and Health Act 1984* (OSH Act) — legislation that is complementary to the *Mines Safety and Inspection Act 1994*.

The objectives of the OSH Act are to:

- promote and secure the safety and health of persons at work;
- protect persons at work against hazards;
- assist in securing safe and hygienic work environments;
- reduce, eliminate and control the hazards to which persons are exposed at work;
- foster co-operation and consultation between employees and employers in the implementation of safety and health standards to current levels of knowledge;
- provide for formulation of policies and co-ordination of administration of laws relating to occupational safety and health; and
- promote education and community awareness on matters relating to occupational safety and health.

WorkSafe achieves these objectives via a combination of education and enforcement activities. It provides policy and legislative advice to government, education and information to employers and employees to assist in preventing workplace injury and disease, and enforces the law while assisting with the resolution of issues in workplaces.

Education activities include the publication of codes of practice and guidance notes covering many areas

of occupational safety and health, annual WorkSafe Forums held in both Perth and regional areas of Western Australia and the extensive SafetyLine website, which is currently being updated to provide even more information in an easy-to-access format.

The ThinkSafe Small Business Assistance Program is another educational tool that offers small businesses with less than 20 employees a free safety assessment of their workplace by an independent occupational safety and health consultant.

Workplace safety and health representatives have a fundamental role in identifying hazards in the workplace and in bringing safety and health concerns to the attention of the employer. WorkSafe offers safety and health representatives elected under the OSH Act a great deal of support in undertaking their duties, and they were given additional authority and empowerment by changes to the legislation last year.

A ten-year National OHS Strategy began in 2002, and Western Australia is committed to the targets set by this strategy. The target is to achieve a 20 per cent reduction in work-related fatalities and a 40 per cent reduction in workplace injury through proactive educational and information programs in nationally agreed priority industries. WorkSafe inspectors are currently participating in these programs, which consist of an education phase in which industries are made aware of their obligations, followed by a compliance phase in which businesses are visited by inspectors. Campaign targets have included the prevention of falls from trucks, manual handling injuries in the health and community services sector, prevention of falls from height in the construction industry and workplace safety in the wine-making industry.

The WorkSafe inspectorate conducts targeted inspection programs in Western Australian industries or



industry sectors known to have higher than average rates of workplace injuries. The inspectorate also investigates workplace incidents and responds to complaints received about workplace safety issues.

Compliance campaigns are positive for industry in that they provide a level playing field and a set of benchmarks across the country so everyone in the industry knows what is expected of them and all others in their industry. And the reaction from industry has been positive — the industries themselves are happy to see that everyone is being treated equally, and that all must meet the same standards.

Because of the amount of consultation and cooperation required and used on these projects, even companies that are normally in competition work together to provide solutions to safety issues prevalent in the industry, for the betterment of the industry as a whole. They share information and learning and can thus make more efficient use of the resources available.

The national approach that has been actively pursued over the past three years is a major step forward for occupational safety and health in Australia and New Zealand. There have been other spin-off effects from taking a nationally consistent approach to occupational safety and health, most importantly that the states are now working together more closely in other areas.

The basis of the occupational safety and health system in Western Australia is consultation and cooperation between the government and its inspectorates, trade unions, industry associations and employers and employees. This is an invaluable tool in the continuing effort to reduce work-related injury, illness and death.

Work-life balance conference

International, national and local experts on work-life balance strategies gathered in Perth on 22 and 23 February this year to share their diverse and often challenging views on the dynamics of the changing world of work.

The two-day conference was hosted by the Labour Relations Division of the Department of Consumer and Employment Protection. Labour Relations is the State Government agency responsible for the promotion of better work-life balance in the public and private sectors across Western Australia.

The focus of the conference was to provide a range of different views on the importance of flexibility in work arrangements to meet the challenges of attracting and retaining a better workforce for today and tomorrow.

Delegates at the conference heard from international speakers including Professor Linda Duxbury from Canada, Andrew Fung from the Ministry of Manpower in Singapore, and Trudie Naughton and Heather McDonald from New Zealand.

Professor Duxbury challenged Australian employers to recognise the need to accommodate employees' requirements for flexibility if they are going to be able to attract the best talent in a tight labour market. Many employers focused on the cost associated with flexible work options, and this ignored the high cost associated with unplanned absence from work and the mental health consequences of work overload. The cost of absence due to work overload in Canada is estimated at CAD\$3 billion per annum.

Andrew Fung said Singapore had embarked upon a program of educating and advising Singapore's CEOs on the value of work-life harmony. The Singaporean government had provided SGD\$10 million to promote work-life harmony, including providing assistance in the development of a business case, developing local capability through training, implementing communication programs and gaining CEO commitment. While the program is in its early stages, the cost-benefit analysis will form an important part of the program.

The work-life balance theme was illustrated in a practical way by local speakers Karl O'Callaghan, Western Australian Commissioner for Police, and Penny Flett, CEO of Brightwater Care Services. A clear message from these speakers was the need to listen to employees and implement programs to meet both business and worker needs. While both speakers recognised that the challenges were significant, the need to attract and retain workers was of prime importance to continue to provide services to the community.

An underlying message from a number of speakers was the need to remain competitive in a global economy and the fact that the demand for workers exceeded the supply, leading to skill shortages in a wide range of areas. Competition for workers was a global issue and Western Australia would be competing with other states and countries for labour. Flexible working hours encouraged older workers to remain in the workforce, increased female participation rates, and reduced work-life conflict for all workers.

Those organisations with strategies such as flexible work options were better placed to attract and retain staff.

On track with

WASM's monorail project

Research from Curtin University's Western Australian School of Mines (WASM) may lead to electric monorails replacing high-powered diesel trucks and loaders in some local hard-rock mines.

The Innovative Mining Systems Research Group at WASM in Kalgoorlie is about to commence a major research project into alternative haulage systems for hard-rock underground mining, which could resolve key health and safety issues at local mine sites. The group is seeking financial support from mining houses and contractors to enable the project to take off.

Headed by Dr Emmanuel Chanda, the group's aim is to evaluate the techno-economic feasibility of the application of the electric monorail haulage systems in metalliferous underground mines in Australia. If feasible, electric haulage systems in some local hard-rock mines will have significant environmental, productivity and safety benefits

for Western Australia's mining industry.

Although electric monorail haulage has been implemented in Europe and South Africa, Australian mine designs generally remain based on truck haulage, shaft hoisting systems or both. With the continual need to minimise carbon monoxide and other gases in underground mines, a key advantage of replacing high-powered diesel equipment with electric haulage is the reduction in pollution from diesel emissions. An additional environmental benefit is the decrease in the amount of waste oils — currently generated in massive quantities on mine sites.

Electric monorail systems are potentially more cost-efficient due to a range of factors. Only the one system is needed for the transportation of workers, material and rock, and excavations for monorail haulage can be smaller and mined at much steeper gradients than for truck haulage — allowing comparatively high-



A monorail operating in a mine tunnel

Photo courtesy of DBT-Scharf GmbH

speed underground development and production. The smaller excavation size also reduces the need for costly stability measures.

The ability of the monorail to negotiate steeper gradients than the one-in-seven maximum common in underground mining may result in significant cost reduction in decline development costs. This is particularly important for narrow, deep ore bodies that are currently uneconomic due to high development costs. Other benefits include reduction of diesel emissions within the underground environment and reduced ventilation requirements.

Dr Chanda said that, in addition to the identified safety, environmental and cost benefits, electric monorails could produce many technological improvements in underground mining.

'The system has the potential to supply electric power reticulation in mines — for example, for drills and other equipment,' said Dr Chanda.

'My guess is that in three to five years we'll see electric monorails operating locally, and this should facilitate the development of innovative mining methods in Western Australia.'

Noise control guideline updated

Work has been completed and approved on updates to the guideline for *Noise Control in Mines*.

The guideline, issued under the *Mines Safety and Inspection Act 1994*, has been endorsed by the Mining Industry Advisory Committee (MIAC). It is an explanatory document that gives information on legislative requirements, details good practice and explains means of compliance with standards prescribed in the legislation.

According to Jerry Wilczewski, Resources Safety's Senior Noise and Vibration Officer, the changes have

resulted from a revision of Australian Standard AS/NZS 1269:2005 — Occupational Noise Management.

These include updated references to approved sound measurement equipment and approved procedures for selection and maintenance of personal hearing protectors.

There is also a new section addressing the issue of appropriate adjustments to employee noise exposure resulting from extended work shifts.

A revised section on audiometric testing reinforces the information

that tests performed under the WorkCover WA legislation are recognised as part of Resources Safety's health surveillance program.

Jerry said that the revised section on audiometric testing was prompted by the need to improve the quality of mine health data by adopting the WorkCover procedure. This also reduces



the cost to industry of carrying out tests.

The update also includes modified forms for noise reporting requirements.

'It is important to remember to take measures to reduce the impact of occupational noise on hearing, by either controlling it at its source or minimising the spread of the noise,' Jerry said.

'One method of finding out if workplace noise levels are high and potentially dangerous is

by standing one metre from a colleague and determining whether you must shout or raise your voice to be heard.'

Hearing loss from exposure to high noise levels can occur very slowly over a number of years, and changes may not be noticed from one day to the next. However, once the damage is done there is no cure.

The updated guideline and further information on noise in the workplace can be found at www.docep.wa.gov.au/ResourcesSafety

Ventilation training and skills

Even a brief review of the history of underground mining will show that the mine ventilation system is critical to the provision of safe and healthy workplaces for employees.

As discussed in last December's issue of *MineSafe* (volume 14, number 4), this objective remains an ongoing challenge for the mining sector, especially in the growing number of deep mines with their increased heat problems and the combination of ever-larger diesel vehicles and longer trucking distances to surface.

One of the key issues in achieving this is the provision of pathways for ventilation officers and engineers to develop the expanding set of skills needed to design, operate and maintain the more complicated and demanding mine ventilation systems required for today and in the future.

According to Dr Rick Brake, one of the country's most respected ventilation specialists, well-trained, competent personnel are a key factor in maintaining a sustainably safe industry.

'Two key issues currently facing the Australian mining industry are the shortage of skilled personnel at all levels due to difficulties of either attracting or retaining workers, and the difficulties in developing, upgrading and maintaining skill sets

in individuals, particularly as workers change roles, employers and locations, and move from residential to fly-in fly-out (FIFO) status or vice-versa.

'Even mines that do have a ventilation officer may not always have access to that person, and FIFO operations are a good example. Some staff positions in these mines are considered to be critical, so that when one person is off site, their counterpart is on site. This would include surveyors, geologists and others associated with the production process.

'However, ventilation staff in hardrock operations are often considered to be non-critical, so that when the ventilation officer is away there is no-one available to provide ventilation guidance.

'I am aware that some FIFO operations in Australia have re-written their emergency preparedness procedures so that the ventilation officer does not have any formal role in the event of an underground fire or other ventilation-related emergency as they are not always on site or contactable.

'This is a significant flaw and a retrograde step because the reality is that no-one knows the mine ventilation system better than the ventilation officer. There needs to be at least a capable "alternate" ventilation officer on site in FIFO operations so that both

day-to-day and emergency ventilation advice are available and will be used when needed.'

Other issues identified by Dr Brake that have had an impact on the provision of ventilation technical capability over the past 20 years include the pressure on mining companies to cut costs, the increased proportion of mines with short lives and the rationalising of ownership, which has led to a loss of employment security. Many ventilation officers are now required to perform multiple roles and, in practice, the ventilation role is often relegated well down the list of priorities. This is particularly true of medium- to long-term ventilation planning, without which the day-to-day ventilation management becomes a succession of short-term 'fixes' that rarely deliver the healthiest or cheapest system for the mine.

The movement of individuals from one company to the next (churning) has led to fewer engineers wanting to invest time and effort in developing technical skills that may make them so specialised that career advancement options become limited, or they find themselves at higher risk of retrenchment in the event of a change in corporate ownership or management.

Dr Brake says that this decreased emphasis on ventilation in many hardrock mines has, in part, led to the relatively fast rotation of young mining engineers through the role of ventilation officer or engineer.

'This results in a wide variation in technical competence between mine sites and, in addition, many mines assume that ventilation knowledge obtained by the engineer as a university graduate is sufficient for him or her to take on the role of mine ventilation officer.

'The churning of the workforce and multiple employers over a working career, along with a lack of structured training programs, can also result in gaps in the knowledge or experience of ventilation staff. When they move elsewhere, there is a danger that they

will think that all mines are like the one where they learned their skills. Moreover, the nature of serious mine ventilation emergencies such as major fires or explosions is that they are low-probability, high-consequence events that simply cannot be learned by on-the-job training.

During a visit to Perth late last year, Dr Brake said that these matters had been recognised by many working groups and conferences on recruitment and retention over the past two years, especially with the recruitment of increasing numbers of overseas-trained mining personnel.

He said that the problems would impact more substantially on the states with economic bases more heavily dependent on their resources industries, such as Western Australia and Queensland.

'This skills shortage has the potential to impact adversely on safety and health in the industry in the next few years due to dilution or downgrading of the existing skills inventory, unless a proactive and coordinated approach is taken to lifting training standards and flexibility of delivery.

'It is my belief that the position of ventilation officer in hardrock mines in all Australian jurisdictions should be a statutory appointment with competency to a nationally accredited standard, as is the case in coal mines,' Dr Brake said.

'A national competency standard is also an essential step towards improving the design and operation of the ventilation systems in Australia. On-the-job training tends to create individuals who are competent only in the issues at their own operation, if that.'

Competency based learning is a different concept to the university style of teaching and assessment, which is largely knowledge based, or earlier statutory requirements, which were frequently experience based. Competency based qualifications have, over time, resulted in significant changes to industry training and, as they continue to flow through the industry, will impact on health and safety outcomes in the future.

Dr Brake said that a national competency standard for hardrock

mine ventilation officers developed by the industry already existed, but its adoption by the industry was slow.

'The standard should be reviewed and become the prescribed competency standard for statutory appointments and adopted as a voluntary code by all mine operators across Australia.'

Dr Brake said national competency standards and portability of qualifications had, in effect, been endorsed by the conference of Chief Inspectors of Mines and its recently produced National Mine Safety Framework. Implementation of this plan has started in all Australian mining jurisdictions.

'It is interesting that the first two of the seven strategies in this plan are provision of a nationally consistent legislative framework and competency support to ensure that workers are competent to do their jobs,' Dr Brake said.

However, at present there is considerable inconsistency across the states. For example:

- Western Australia and Queensland are the only states to regulate their mining industry solely using health and safety legislation written specifically for mines;
- New South Wales, Victoria and South Australia all have some mine safety legislation sitting under the umbrella of more general workplace health and safety legislation;
- Tasmania no longer has any specific mines occupational safety and health legislation for either coal or hardrock; and
- some states in Australia have legislated (statutory) requirements relating to people designing, controlling or monitoring the ventilation system in a mine. All mines that have radiation issues are also required by statute to have a mine ventilation officer.

This inconsistency is resulting in significant confusion and uncertainty in those states without clear mining legislation.

An additional issue is the increasing problem of heat in many mines.

This has led to the introduction of four new courses into the Australian Qualifications Framework (AQF) in the areas of psychrometry, mine heat loads, mine refrigeration and heat stress. These are specialist areas in which ventilation staff in an increasing number of mines now need to be competent.

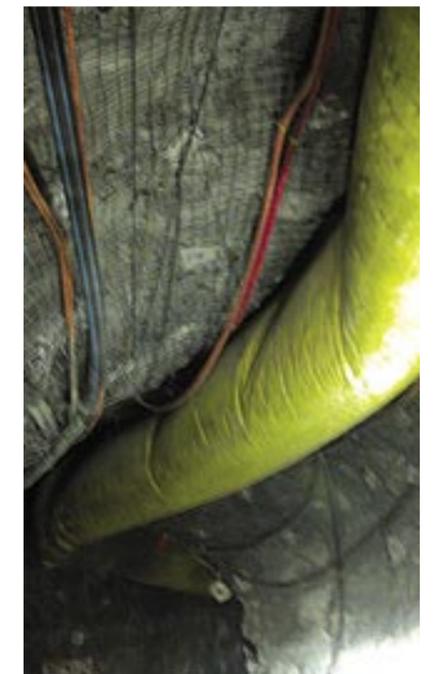
Ventilation modelling and network analysis is also a vitally important skill for the ventilation officer or engineer, and is now a separate course in its own right in the AQF.

Successfully completing these courses provides staff with recognition across Australia, as the assessment is to a recognised Australian standard. Cross-recognition with the coal industry is also possible, which means skills can be transferred between the coal and hardrock industries. These courses can also lead to students obtaining the Advanced Diploma in Mine Ventilation, which is a completely new qualification available in the AQF.

The first of these new training courses to the AQF standards was recently conducted by Dr Brake in Perth and attended by Terry Sievken, Senior Occupational Health Inspector, Resources Safety. A course is currently underway in Mackay, Queensland, and additional courses are scheduled for 2006 in Perth and Newcastle.



Australian Student Mineral Venture students learning about ventilation at WASM



A ventilation bag in an underground mine

Accident and incident

reporting made easier

A revised and updated guideline on accident and incident reporting has been released by Resources Safety with the aim of helping employers and employees to better understand their reporting duties for accidents involving injuries to people, and occurrences, commonly referred to as incidents.

The guideline, issued under the *Mines Safety and Inspection Act 1994*, has been endorsed by the Mining Industry Advisory Committee (MIAC). It is for use by anyone responsible for reporting accidents and incidents on mine sites and exploration leases.

Included in the document are details on who is responsible for reporting the events, how and when they are to be reported and the submission requirements for written reports.

The data collected are entered into Resources Safety's AXTAT and Incident Reports databases.

The AXTAT database is used to record and retrieve information about lost time and disabling injuries, and is an extremely important tool used by Resources Safety to identify trends

in reported incidents. The data can identify segments such as unsafe work practices causing frequent injury, the predominant types of accidents in particular occupational groups, workplaces or both, the frequency of injury to particular parts of the body and activities being pursued at the time of the accident. This information, which is typically released as *MineSafe* articles, significant incident reports or safety bulletins, can be used by the industry to set up practices to avoid similar accidents and incidents in the future.

The Incident Reports database is used to record and retrieve information about incidents in the workplace, and provides a useful tool for identifying trends in reported incidents and assessing risk. A version of this database is accessible online at www.docep.wa.gov.au/ResourcesSafety

Procedures for completing AXTAT report and occurrence report forms

As part of the package to assist the industry to complete these reporting requirements, Resources Safety

has also revised its *Procedure for completing AXTAT report forms* and developed a new *Procedure for completing an occurrence report form*.

Following the procedures outlined in these documents will help to ensure uniformity and reliability of the data collected for the AXTAT and Incident Reports databases.

The aims of providing this suite of three documents are to:

- help ensure the duties of stakeholders are clear and unambiguous;
- foster innovation and improvement; and
- remove duplication of effort.

It is our aim to establish consistent and reliable performance data collection, analysis and publication systems so that decisions about accident and incident prevention can be based on valid information.



Census collectors

seek mine assistance

Seven years of planning by the Australian Bureau of Statistics (ABS) will reach a climax on 8 August this year with the 2006 Census count of all people in Australia.

The count of mining workers in Western Australia is a key part of the Census, but is difficult because many mining and exploration activities take place in remote or difficult-to-access locations. The ABS is taking special care to make a full count of mining workers by allocating a specialist team to focus on the mining industry.

Assistant Director of Special Strategies, Andrew Jones, said that his team of Census staff will be contacting all mining companies and sites in advance of the Census to consult with employers about the best ways to reach their workers.

'Mining industry information is important for the planning of community facilities. The Census helps determine future infrastructure needs as well as the allocation of funding, which is vital in regional areas. The Census also shows how a

region's population is changing, and helps decide where schools, hospitals and health clinics will be needed,' Andrew explained.

'Some miners tell us they are concerned about the confidentiality of the information they supply in their responses to the questions in the Census form.

'The Census has been conducted for 95 years and no identifying information has ever been provided to any other government department or agency. In fact, we would be breaking the law to do that and would be subject to heavy penalties if we tried.

'In addition to the option of returning completed Census forms to the collector, people this year will have the added convenience of being able to fill in their form on the internet. Each household will be given a household form, a guide to filling out the form and a sealed eCensus envelope. People choosing the eCensus option will need to enter the household number which is on the main form, and the PIN, which is inside the envelope.'

Census facts

- The first national Australian Census was held in 1911.
- The 15th Australian Census is being conducted in August 2006.
- Censuses are held every five years.
- Each Census counts every person in Australia on Census night, except diplomats and their families.
- Tourists and visitors to Australia are counted regardless of how long they have been here or plan to stay. Australians who are overseas on Census night are not counted.
- Census forms will be delivered in the two weeks before Census night and will be collected by early September.
- Processing of Census data will take 12 months to complete. Once processed, the Census forms will be destroyed.
- All Census information collected is strictly confidential and no information will be released that will allow individuals, or households to be identified.

Accident log book

Format of log book and entries

The accident log book required by section 77 of the *Mines Safety and Inspection Act 1994* (the Act) is a bound, hard-covered book with ruled pages and the pages numbered throughout. The size of the book is normally A4 or foolscap, generally with at least 150 pages.

Every entry in the log book must be made in ink. The term 'made in ink' allows various writing media that are not erasable — such as biros, fountain pens and felt-tipped pens. It is also acceptable to securely affix typewritten or

computer printouts into the log book — for example, where data entry and management is by electronic means.

All entries must be dated and signed, with the name of the person making the entry clearly identified.

Electronic data records

Because the accident log book is used to record information that may be stored in an electronic database, the information may be kept in electronic format provided a printed copy of each entry is available for immediate

reference in the hardcopy accident log book described above.

If it is found that data entered in an electronic database are erroneous, incomplete or inadequate, and these are corrected or updated, then an addendum dated and signed by the person authorised to make the data entry must be securely affixed to the hardcopy accident log book.

Access to electronic data records, particularly accident data, must be restricted and, for personnel other than those authorised by the manager, must be available on a read-only basis so that no

unauthorised alterations, deletions or additions may be made to any existing information.

Integrity of record keeping

It is essential to maintain the integrity of the accident log book. Any interference with or deletion of information from such documents is an offence under section 101 of the Act, which relates to false or misleading information.

Electronic data entry should only be made by persons who are authorised by the manager, and who have

individual access codes, and each entry must carry the name of the officer making the entry and be dated.

Safekeeping and long-term storage

The accident log book for an operating mine is to be kept by the registered manager at the mine site. For exploration operations not at an operating mine, the record book is to be kept at the office of the exploration manager.

The manager must ensure that the book is kept safely in good order and condition.

The principal employer for the mine is responsible for all record and log books — including accident log books — that have been kept under the Act in respect of the mine for so long as mining operations continue at that mine. If mining operations are abandoned or suspended, the principal employer at the mine at that time must keep all such books for a period of six years from the time of abandonment or suspension; and if the principal employer appears likely to go into liquidation or receivership must take steps to ensure that such books are safely kept for that period.

A different perspective

on risk management

Roger Kahler is a passionate man with a vision. His vision, and that of his organisation InterSafe, is the elimination of permanent personal damage in the workplace.

To do this is no small task, and to move towards achieving this vision, Roger aims to provoke debate in the safety sector about the way it currently uses the risk management approach and encourage a more scientific approach through the use of the processes of taxonomy, modelling, hypothesis forming and testing.

Roger, whose organisation is based in Queensland, contacted Resources Safety after reading the article *Can Pareto's principle help miners?* in the September issue of *MineSafe* (volume 14, number 3).

After discussions with Resources Safety's Technical Services Director Adrian Lang, Roger flew to Perth and gave a presentation to Resources Safety staff on his views of occupational safety and health (OSH) practices.

InterSafe employs eleven people who investigate between 400 and 500 permanently disabling and fatal accidents a year. Roger, a mechanical engineer, has been working in the area since 1983 and has been

closely involved in both the coal and metalliferous sectors, having investigated over 4,000 accidents.

He maintains a comprehensive library that holds and describes the patterns of personal damage for tens of thousands of incidents.

In a paper he presented at the Occupational Health & Safety NZISM & NZOHNA Conference in New Zealand in 2003 entitled *Safety in the 21st Century*, Roger suggests that the scientific processes of taxonomy, modelling and hypothesis forming and testing are poorly applied and poorly understood by the majority of OSH practitioners and all levels of industry management.

He recognises that 'poorly' is an emotive and value-based word, but the size of the work-related personal damage problem is so significant and so unchanging that emotive expressions may, at least, focus people's attention to a place where there is an improved chance that they will respond to information about personal damage that uses a thinking or factual function. Roger believes that there are a lot of problems with current OSH practice. Leadership continues to believe strongly in regulation and personal accountability, particularly at the workplace. Roger thinks there is a partial truth to this emphasis, but it

will never produce meaningful and enduring change.

According to Roger's data, in 1992 the cost to Australia of work-related personal damage was A\$20 billion, and in 2003 the Productivity Commission put it at A\$34 billion.

In summary, for the year 1992–1993:

- there were 50,711 cases of permanent damage, costing A\$15.7–\$16.4 billion; and
- there were 339,309 cases of temporary damage, costing A\$3.1–\$3.6 billion.

Applying the Pareto principle, 83% of the cost is from 13% of the cases.

For the year 2000–01, from 480,222 occurrences (see table):

- 51,520 were permanent damage (fatal and non-fatal);
- 301,300 were temporary damage; and
- 127,400 were minor damage.

Of the 51,520 incidents involving permanent damage:

- 2,620 were fatal (410 traumatic, 2,210 disease);
- 26,900 were non-fatal, with no return to work; and
- 22,000 were non-fatal, with reduced income work.

In other words, of about 50,000 cases per annum, there were 1,000 cases of permanent damage per week or 142 cases per day, 7 days per week, 365 days per year.

The total cost derived from direct and indirect costs is estimated at A\$34.3 billion and is allocated to:

- permanent, fatal — A\$1.1 billion;
- permanent, non-fatal — A\$30.5 billion; and
- temporary and minor — A\$2.7 billion.

This means that 92% of the cost comes from 11% of incidents — the fatal and non-fatal permanent incidents.

'It is clear that these figures indicate that if the cost of workplace injury is to be reduced, there must be a strong focus on the elimination of the potential for non-fatal permanent damage,' Roger says.

'There is nothing to indicate that the size of the problem is decreasing, either with respect to absolute numbers or cost and, in fact, the argument can be strongly mounted that the size of the problem associated with non-fatal permanent disability is increasing.

'As the burden of permanent personal damage from work is not decreasing, we need to challenge our perspective of the problem. For occupational health and safety to progress, there has to be a stronger application of the scientific method.'

Roger uses the example of the decrease in mortality rates in western countries for the major killers — heart disease, stroke and cancer — and suggests that the life expectancy rates have risen as the diseases are better understood and managed. This has happened through the application of, at least, the scientific method by the medical profession.

The medical profession has applied the scientific process through the use of taxonomic and epidemiological principles, biomedical and clinical

research, and translation of that research into practice.

Is legislation the answer?

Looking at the legislation to see what had taken place to bring about a reduction in mortality rates for heart disease, stroke and cancer, Roger could not find any.

'I contend that the reduction in heart disease, stroke and cancer has happened through motivated individuals who have perceived and understood the problem, responded to the need out of compassion and, with a strong discipline of searching for truth, they have made progress.

'In their (the medical researchers) search for truth, they use appropriate models, form and test hypotheses and make deductions, which results in courses of action that produce deliverable results. They review the problem objectively and do not impose value judgments of rightness or wrongness, or goodness or badness.

'Why should occupational health and safety be any different?

'I have not seen evidence of the medical profession having to legislate to achieve progress and the question must be asked of whether legislation works. The question must be asked because industry is swamped with Acts, regulations, codes of practice, advisory standards and so on. Within Australia we have introduced the Robens-type legislation into occupational health

and safety, and that has resulted in less law and greater numbers of advisory standards and codes of practice to guide employers in the implementation of fulfilment of duty of care. By comparison, a summary of the American occupational safety and health system would be for the introduction of more law. Even with all this regulation and differing approaches, the size of the permanent damage problem (90% of the cost) is not reducing in Australia and the best estimate is that it is not improving in the USA.'

Roger believes that if the problem is to be more effectively managed in the 21st century, what is missing and must become the norm is a stronger scientific discipline and a stronger 'thinking' versus 'feeling' function. That is, what we do in occupational health and safety must be based less on feeling and valuing and more on truth, fact and scientific discipline.

Roger also believes that there are some major hindrances to progress, including the absence of industry-based taxonomic data that allow for clear pattern analysis of differing levels of personal damage — that is, multiple fatalities, single fatalities, non-fatal permanent damage, upper and lower temporary damage and minor damage. Another hindrance is the unshakeable belief that industry places on the 'inferential' value

Continued on page 14...



In 1992–1993 there were 50,711 cases of permanently disabling injury in Australia

Number of cases and cost of damage — Australia 2001–01

	Minor	5 days, full duties	> 5 days, full duties	Permanent reduced income	Permanent no return to work	Fatal
No. of occurrences	127,400	186,400	114,900	22,000	26,900	2,620
% of occurrences	26.5%	38.9%	23.9%	4.6%	5.6%	0.5%
		62.7%		10.7%		
Cost of occurrences (\$ billions — total 34)	0.0	0.4	2.3	4.9	25.6	1.1
% of cost	0.0	1.1	6.7	14.3	74.6	3.3
	Class III	Class II — temporary		Class I — permanent		

Source: National Occupational Health & Safety Commission, *The Cost of Work-Related Injury and Illness for Australian Employers, Workers and the Community*, August 2004, Canberra.

of the Bird incident triangle while neglecting the reality of it being a descriptive statistic — that is, it shows a ratio of numbers but it is invalid to draw inferences about the top of the triangle based on the reported incidents at the bottom of the triangle. In other words, a cut finger is not a predictor of a mine blowing up through a gas explosion.

A further aspect that he believes is a hindrance is the fundamental belief in accident causation models based upon unsafe acts, unsafe conditions and human error models that are, in turn, supported by ratios such as 88:10:2 — that is, 88% of accidents caused by human error, 10% by machine design and 2% for theological reasons or variations thereof.

In relation to taxonomic data there is a clear need for data that allow effective communication by OSH professionals to all levels of the organisation. The patterns that are

observed then have to be understood and the information organised using appropriate models.

'If we cannot describe the patterns associated with the different levels of damage, then the flow-on ramifications are significant and the weakest area of pattern analysis relates to permanent disability,' Roger stated. He uses a personal story to demonstrate, describing travelling in a coal haul truck with an operator. The operator is asked, 'How are you most likely to be seriously injured while doing this task?' The truck driver replies that, during training, the instructor had told him to watch out for the digger (excavator) falling off the coal bench onto the truck.

According to Roger, the interesting aspect of this response is that this type of accident does not appear in either the fatality studies, the non-fatal permanent disability studies or the temporary damage studies for the coal mining industry.

What does appear, with respect to permanent disability in the mining

industry, are three energy types — human, vehicle and gravitational — that constitute over 80% of all the permanent damage (non-fatal).

Within vehicular energy, 60% of the cases involve the person being jolted and jarred through trucks striking potholes and driving over uneven floors, with the vibration exposure predisposing the person's susceptibility to damage from jolting or jarring.

Basically, if factual information on what damages is not available to those who do the work or those who manage the work, the problem will not change.

'The haul truck driver needs factual information with respect to his or her individual exposure — that is, the state of the haul road and pit floor conditions and the quality of the truck access,' Roger notes.

'If our leaders at all levels and workforce are not provided with the factual data, they will inappropriately organise their "damage management" activities.'

New audiometric test requirement

Resources Safety recently recognised the need to further improve the quality of audiometric records submitted to MineHealth under its health surveillance program. Consequently, as of 1 May 2006, Resources Safety will only accept test results that have previously been entered (i.e. online) into the WorkCover database as required by the *Workers' Compensation and Injury Management Act 1981*.

A printout of the WorkCover 'individual test summary' screen should be attached to the MineHealth health assessment form as part of the submission to Resources Safety. This requirement will apply to both the initial and periodic health assessments.

The revised requirement will streamline testing procedures,

ensure better quality control of audiometric test data and, ultimately, reduce the mining industry's cost of undertaking audiometric tests. It will also re-align administration of both pieces of legislation and provide readily retrievable records of mining employees when compensation claims are made in the future.

Submission of information on the health of mine employees is required under section 75 of the *Mines Safety and Inspection Act 1994* and specific requirements are detailed in the *Mines Safety and Inspection Regulations 1995*.

Note that the health surveillance program only applies to new and existing mining employees and, therefore, any pre-employment medical checks are not covered by the scope of the mining legislation.

Prospective employers are required to use their own guidelines and make their own decisions on the suitability of employees for a particular job.

There are certain categories of employees, such as those working in offices, administration buildings or recreational facilities, who are excluded from the requirements of the health surveillance program. The same exclusion applies to contractors or self-employed persons who do not work at a mine for a period exceeding one month or who work for a cumulative period of less than three months over a 12-month term.

Finally, it is the responsibility of employers to pay the expenses of any health assessment or biological monitoring required under the mining legislation.

Delivering outcomes — a case for safety

The inaugural Chamber of Mineral and Energy's (CME) Occupational Safety and Health Conference held in Perth in March has been hailed an outstanding success.

More than 200 delegates from Australia and overseas attended the two-day conference themed on Delivering Outcomes: A Case for Safety.

CME chief executive Tim Shanahan said the conference was an outstanding success, bringing together mine managers, safety and health practitioners and representatives from across the Western Australian resources sector to gain insights into the systems that can make the workplace safer.

'Participants learned the latest on the factors influencing workplace safety from leading international academics, and the practical experience of applying risk management systems in Australian industries,' Mr Shanahan said.

'We look forward to organising future conferences on the theme of occupational safety and health, and contributing to safer workplaces in the state's resources sector.'

The conference provided a forum for international, national and local experts to discuss the application of risk management methodologies to improve safety performances in the workplace.

Addressing the conference, Resources and Employment Protection Minister John Bowler said that a series of recent accidents in Western Australia's mining sector clearly demonstrated the urgent need for employers and employees across the state to refocus on safety and health issues.

'All stakeholders in the resources sector need to demonstrate their commitment to ensuring workers are able to return home safely at the end of every shift,' Mr Bowler said.

The Minister's comments were echoed by Mr Shanahan.

'There is the need to improve how we do risk management to ensure better safety outcomes in the Western Australian resources sector, and the industry is strongly advocating the need for a new regulatory model which formalises the requirement for robust risk management,' Mr Shanahan said.

'This will require companies to demonstrate that they are aware of their hazards and have controls in place to manage them effectively.'

As well as sessions on how risk management techniques can add value, industry initiatives to improve safety performance and practical applications of risk assessments, the conference also held an insightful mock court session.

The court was based on real life prosecutions tailored to the resources industry, and highlighted some of the typical practical and legal failings experienced by most businesses.

Clear messages were that employers also owed a duty of care to incompetent and careless employees and that an absence of accidents in a workplace did not actually prove an employer was complying with the Act — they might have just been lucky.

What was said

'Just because that's the way we do it, doesn't mean it's right.'

— Dr Scott A. Shappell, Professor of Industrial Engineering, Clemson University

'Safety is about caring for people. What is the risk, what is the hazard? Never become complacent; never be comfortable with what you do.'

— Jack Hamilton, Woodside Energy

'A good risk assessment identifies hazards, describes them in detail and prioritises them in order of risk.'

— Tony Pooley, GHD Management Consulting

'Avoid normalisation — an event that hasn't happened for a long time is [considered] so rare that it becomes disregarded.'

— Peter Crooks, Health and Safety Manager, Diavik Diamond Mine

'The person at risk must be in the risk assessment.'

— Stephen Lawson, Global Advisor Risk and Opportunity Management, Newmont Australia Ltd



Delegates at the Chamber of Mineral and Energy's Occupational Safety and Health Conference

Photo courtesy of Australasian Mine Safety Review — John Ninness

Finding refuge **underground**

The recent use of the underground refuge chamber at St Ives Leviathan mine serves as a timely reminder to alert industry regarding Resources Safety's guideline — *Refuge chambers in underground metalliferous mines*.

Nine miners were rescued from the underground refuge chambers they escaped to after a remote-controlled loader caught fire at the Kambalda gold mine.

No one was injured, with the well-coordinated emergency response team bringing all to the surface within hours. A Resources Safety inspector was on site within an hour of the department being advised of the incident.

Western Australia is a leader in technology for safe refuges for workers threatened by incidents such as underground fires, and our guidelines have attracted worldwide attention.

The Resources Safety guideline is becoming the world standard for such installations, and Western Australia is also home to a world-leading designer and manufacturer of the refuge chambers — MineARC.

It has long been a requirement under our mining safety legislation and regulations that mining employers and managers provide fire refuge chambers and fresh-air bases for persons working in each underground mine.

The guideline, believed to be the only one of its kind in the world, was first published last year and was endorsed by the Mines Occupational Safety and Health Advisory Board (MOSHAB), now replaced by the Mining Industry Advisory Committee (MIAC).

It was designed to provide guidance on the safe use of appropriate refuge chambers as part of a response to hazards posed by irrespirable atmospheres underground.

The information was based on a series of risk assessments undertaken between 1997 and 2003 at 13 underground mines in Western Australia. These assessments were undertaken by individual mining operations independently of Resources Safety. The guideline also sourced information from fire reports from Western Australian, national and international mining safety authorities.

Following a Tasmanian incident where three miners were trapped in an underground mine near Zeehan, Western Australian mines inspectors were requested to check on the relevant operations in this state. According to Resources Safety inspectors, it appears that some mine managers are still not aware of the new guideline and have done little to upgrade their refuge chambers.

The guideline says that the most contentious issue associated with the use of refuge chambers appears to be the question of how long refuge chambers can reasonably be expected to support a full complement of occupants while operating in stand-alone mode.

Experience worldwide, from incidents where reliable information was available, suggests a duration norm of between two and ten hours.

The guideline suggests that, because there is so much variation, it is difficult to establish an acceptable duration guide. The Resources Safety guideline takes a necessarily conservative view, and its recommendations are based on a worst-case scenario. One of the principal recommendations is that the supply of oxygen should be available for 36 hours. Previously, the rule of thumb was a supply time of eight hours.

The new stand-alone time is based on a large rubber-tyred vehicle catching fire while travelling in a main intake airway. The danger of re-ignition, a tyre explosion or both may persist for up to 24 hours, and it is deemed unsafe to approach the vehicle for this period.

While it could be possible to get past the burned-out unit and bring the occupants of the refuge chamber or chambers out on foot, it should not be assumed this would be viable in all incidents.

Eight hours is a reasonable period to allow for clearance of the wreck and restoration of normal services, bringing the total time before a realistic start of rescue operations to 32 hours. In Resources Safety's view an additional safety margin of four hours is reasonable.

The technologies do exist to support a stand-alone operating time of 36 hours.

Copies of the guideline are available online at www.docep.wa.gov.au/ResourcesSafety, by emailing ResourcesSafety@docep.wa.gov.au or by telephoning 9222 3229.



An underground refuge chamber in a Western Australian mine

Clean machines help protect

farming and the environment

Western Australian biosecurity measures require all used agricultural and mining machines imported into Western Australia from other states and territories to be free of soil and plant material.

The Department of Agriculture's Western Australian Quarantine and Inspection Service (WAQIS) inspects all machinery and orders cleaning if required, when imported into the state. This is to prevent the possible introduction and spread of exotic weeds, pests or diseases that may be contained in soil or plant material left on machinery.

The present mining boom means a steady stream of mining machinery for a company such as Action Mining Services, based at Hazelmere near Perth Airport. However, as an accredited member of WAQIS's 'Registered Premises' scheme, Action Mining is able to carry out cleaning in a quarantine-approved washbay to ensure containment of any contaminants that may be present.

Staff member Rod Graveson, who manages the quarantine bookings and cleaning for the company, said where time was money, it was a great advantage to have been trained.

'We have been trained and are audited by WAQIS, so we can get on with the job and deliver a machine more quickly to the customer,' he said.

The amount of time required to clean a machine varies greatly depending on its condition when we receive it, from less than an hour to five days, as may be the case for a harvester which has so many parts and cavities to check.'

Rod said the company also contracted services to other importing companies and the expanded business will require a doubling of their wash-down facilities to keep up with demand for quarantine cleaning.

Lesley Lally, WAQIS Technical Services Officer, liaises with and trains some 250 Registered Premises in the identification, initial handling and security of quarantine-risk items requiring inspection.

The Registered Premises range across 16 categories, including plant nursery goods, fresh produce, trucks, large machinery, containers, hides, skins, wool, seeds and laboratories that routinely handle soil samples for mining companies.

Lesley said that the main advantage of becoming a Registered Premises for a business routinely importing goods from the eastern states, and subject to quarantine inspections, was that unloading of quarantine-risk items could be carried out by the business without WAQIS supervision, and placed into the designated areas for inspection.

'This allows greater flexibility and better time management because trucks could be waiting around for some time before an inspector is available to supervise inspection and clearance,' she said.

For enquiries about Registered Premises, contact Lesley Lally on 9334 1811.

Refuge chamber guideline update

Please note that an addendum has been made to Resources Safety's *Refuge Chambers in Underground Metalliferous Mines* guideline. In section 13, the following paragraph has been replaced:

'The use of braided or armoured cable is encouraged by DoIR when wiring underground installations. It is accepted that there is a cost penalty but it is not great and the safety benefits are significant.'

The replacement paragraph reads:

'The Mines Safety and Inspection Regulations 1995 require all mains wiring installed underground to be metallically covered and earth-leakage protected.'



Action Mining's quarantine services manager Rod Graveson and WAQIS quarantine inspector Lesley Lally at the company's wash-down facility.

Why nobody likes safety training

The following extract from an article by Larry Wilson, a US based behaviour-based safety consultant, raises some interesting discussion points.

Why does everybody look like he's going to the dentist when walking into the safety training room? And if you think there's any truth in the old, 'You can fool some of the people all of the time, and all of the people some of the time,' then maybe, just maybe, there's a reason all of the people, all of the time, don't like safety training.

Perhaps it isn't the 'safety' part of the training they mind so much; it's the 'nothing new' part they object to.

Imagine how you would feel if you were (finally) given sex education at 60, or golf lessons after you had already played 90 to 95 per cent of the golf you were going to get to play in this lifetime. Now, compare that to how you'd feel if you were given the golf lessons when you still had 90 to 95 per cent of your games left to play. Understandably, there would be more resentment from the folks who only have 5 to 10 per cent left.

Isn't that what happens to people when they get safety training? Think about it: how old would you have been by the time you had already experienced 85 to 90 per cent of the injuries — the total number of injuries



Teaching children safety concepts and techniques could improve their workplace safety as adults

— you were going to experience in this lifetime?

Keep in mind that little kids get hurt, in terms of a visible cut, bruise or scrape, about 15 to 25 times per week, or 80 to 100 times per month. Eventually, of course, you, me — all of us — started doing a better job with eyes on the task, mind on task, line-of-fire, and balance and traction, or grip. But this did not happen until we managed to sustain thousands of minor injuries. However, even though all of us have improved about 5,000 per cent from the time we were children (15 to 25 per week vs 15 to 25 per year as adults), we also have been increasing the amount of hazardous energy we get to play with and eventually work with.

We learned how to ride a two-wheeled bicycle, we got to go out on the lake with the little aluminium boat, and then came the snow mobiles, trail bikes, and eventually, at around 16 or 17, we got to drive a car. Compare this improvement with the amount of hazardous energy we get to work with or play with, examine the interval between 15 and 25, and ask yourself, 'How many serious injuries did I experience during this time?'

If you're like most people, more than 50 per cent of your serious injuries happened during this time period. And when do people finally get some safety training? After they're 25. It's no wonder they're only so keen.

There are four critical errors that can increase the risk of contact with hazardous energy. There are also only four states that cause the vast majority of these errors. The state-to-error risk pattern is involved in more than 90 per cent of all serious acute injuries on or off the job (excluding contact sports). Teaching people about these state-to-error risk patterns is just one of the things they need to learn. Coincidentally, there are also only four error reduction techniques:

1. Self-trigger on the state (or amount of hazardous energy) so you don't make a critical error.

2. Analyse close calls and small errors to prevent agonising over big ones.
3. Look at others for the patterns that increase the risk of injury.
4. Work on habits.

Teaching employees these four critical error-reduction techniques has helped more than a million adults in more than a dozen countries reduce workplace injuries by more than 50 per cent in two years, which is good. But how much more effective would it have been if these adults could have learned these techniques before they hit that high risk/high injury period from 15 to 25? If we could get the employees to teach these concepts and techniques to their children, if we gave them the tools they need to be able to teach these concepts to their children, we might be able (finally) to get them more interested and more involved in safety and accident prevention.

There are good reasons why people don't like safety training. And don't try to scare adults into being safer, either. If it worked, it would have worked by now. Instead, look for where the water is running downhill. They do care about their kids' safety. When you ask them whether they worry about whether their kids will be as lucky as they were, all of them put up their hands.

So unless you are one of those trainers who actually likes to hear the sound of your own voice over and above the snoring and fidgeting in the room, turn the boat around and start paddling downstream, towards home. It's so much easier.

For more information, please visit the Safestart and Safetrack website at www.safestart-safetrack.com

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Safety and health representatives section

Ask an inspector



Brett Boneham has been with Resources Safety (in its present and previous guises) for more than ten years. He has a strong mining heritage, with his ancestors among the first pioneers to

settle in Kalgoorlie. Brett commenced his working life by completing an engineering apprenticeship with WMC at the Kalgoorlie Nickel Smelter, then gained extensive experience over the following decade working for various mining companies and contractors in engineering maintenance roles within the Goldfields.

In his position as Special Inspector of Mines (Machinery) with Resources Safety, Brett has liaised and consulted with industry, conducted hundreds of inspections, audited companies and investigated fatalities, accidents and incidents at drilling operations all over Western Australia.

Brett is very passionate about improving safety standards in the mining industry. He developed a High Impact Function Audit on Exploration Drilling Safety, which is highly regarded by industry and serves as a valuable guideline to companies for managing the safety of their exploration operations.

Brett is often asked about classified plant, which is covered in Part 6 of the Mines Safety and Inspection Regulations 1995. The most common questions he is asked are:

- what needs to be registered?
- how do I register it?
- who can inspect it?
- how is it inspected?

Essentially, classified plant is plant that has traditionally been extremely

hazardous, such as pressure vessels, boilers, cranes and hoists used to lift people.

The classified plant registration and inspection process described in the regulations is an administrative process to ensure that such hazardous items are not used without verification that their design and condition conforms to relevant Australian Standards.

To achieve this, the registration process begins with items of plant being assessed against the regulations to determine if they require registration. If it is determined that an item of plant is of a type requiring registration, an application for registration must be made. Only persons who are authorised by the registered manager of the mine can apply to register classified plant, and evidence of this must be included with the application.

Applications are reviewed then accepted, rejected or put on hold. The main reasons for rejection of an application are that the documentation submitted is incomplete or there are discrepancies in the information provided. An application will be put on hold if additional information is required.

Once an application has been accepted, a registration letter is issued. This will normally require certain actions, such as marking the registration number on the plant and carrying out a statutory inspection.

The registration process should start well before the plant is manufactured and supplied to a mine. Too often, Brett sees the registration and inspection process commencing when an item of plant has already been supplied to a mine and, in many cases, is already in use, which is a contravention of the regulations.

This problem arises because many mines do not have a formally documented system for managing classified plant, and people may not be familiar with legislative requirements.

A high impact function audit, guideline and application form on classified plant have been developed

and trialled by Resources Safety, and have already helped mining companies to achieve compliance.

The audit, guideline and application form are available on the Resources Safety website at www.docep.wa.gov.au/ResourcesSafety, or by contacting Brett Boneham (tel: 9222 3833, email: bboneham@docep.wa.gov.au).

Resources packs

Resources Safety recently mailed out resources packs to all registered safety and health representatives (SHRs). The packs included posters about:

- what an SHR does;
- who your SHR is;
- the process to be followed if an SHR issues a provisional improvement notice;
- what happens when an improvement or provisional improvement notice, or a prohibition notice, is received;
- the safety performance of the Western Australian mineral industry for 2004–05; and
- the Mine Safety Matters brochures available from Resources Safety.

If you are a properly elected SHR and did not receive this resources pack, please contact Julie Steven [see details below].

Keep us informed

To keep our safety and health representative contact list up-to-date, please advise Julie Steven in Resources Safety (ph. 9222 3438, fax 9325 2280, email jsteven@docep.wa.gov.au) if you are no longer a safety and health representative, but also let her know if you would like to remain on our mailing list to receive *MineSafe*.



Safety bulletins and significant incident reports

All bulletins and reports are available online at www.docep.wa.gov.au/ResourcesSafety in the Mining Safety and Health section

Mines Safety Bulletin No. 75
Released 10 January 2006

Fire and explosion in a working party magazine

This bulletin is issued following extensive investigation, technical review and test-work relating to a fire and subsequent explosion that occurred in a working party explosives magazine underground at a mine with sulphide mineralisation during 2005.

Incident

At about 5.45 am, a fire behind the locked gates of a working party magazine was observed by underground personnel who were passing the area. Attempts were made to put out the fire using Dry Chemical Powder (DCP) fire extinguishers, but these attempts were unsuccessful.

It was estimated that in excess of six tonnes of explosives and between 1,500 and 3,000 detonators were stored in the working party magazine at the time of the fire.

Five people were able to escape from the mine through the decline portal entrance while a further 22 personnel, who were unable to use this means of egress, travelled to fresh-air bases and refuge chambers underground where they were all

accounted for. Once accounted for, the personnel were moved to the shaft plat in preparation for evacuation from the mine.

Delays occurred in evacuating personnel through the shaft, as it was in transition from shaft sinking to equipping the production winding system. This necessitated the completion of a risk analysis so that the sinking kibble could be safely used for the evacuation of personnel.

About two hours after the fire was identified an explosion occurred which knocked out the underground communications. The explosion also stopped two surface fans for a brief period until they could be restarted.

Injuries

Four people in the vicinity of the working party magazine, who attempted to fight the fire, suffered smoke inhalation. No personnel suffered any serious injuries during the emergency evacuation from underground. The potential for serious consequences is, however, obvious.

Causes

The cause of the ignition in the magazine was not determined with certainty due to the damage sustained. However, the following contributory factors were evident as a result of investigation, technical review and testing:

- Reactive mineralisation, containing sulphide material including pyrite and chalcopryite, was present in the rock in which the magazine was excavated. Marcasite was also identified — a

material that could react with ammonium nitrate in the explosive stored in the magazine and cause self-ignition as a result of the chemical reaction.

- ANFO was known to have spilled in the magazine prior to the incident. ANFO is known to interact with sulphides to cause an exothermic reaction. The chemical reaction may have a long induction period with little observable temperature increase. However, once sufficient catalysing species have built up, the reaction rate increases rapidly, generating sufficient heat to cause self-ignition.
- Ammonium nitrate is also an oxidising agent, which evolves its own oxygen during chemical reaction. This made it impossible for the dry powder fire extinguishers to smother the fire. Water application is the primary suppression method recommended in explosives manufacturers' material safety data sheets.
- A number of empty 500 kg bulk ANFO bags were allowed to accumulate in the magazine, stacked in close proximity to full ANFO bags. This would have provided an additional fuel source and assisted in the propagation of the fire.
- A number of personnel authorised to enter the working party magazine were found to be smokers and routinely carried cigarettes and lighters into the magazine. However, there was no evidence from witness statements or previous inspections and audits that personnel had been smoking inside or in the vicinity of the magazine immediately prior to the incident.

- The working party magazine was being utilised to supply several jumbo development headings concurrently. Consequently, a quantity of explosives in excess of six tonnes was being stored in one area for this purpose.
 - There was no regular shift supervisory inspection carried out in the working party magazine on the shift the incident took place or on the shifts immediately prior to the incident.
 - The explosives management plan for the mine did not detail the storage requirements mandated by legislation and regulation.
 - The explosive management plan required weekly contractor inspections and monthly principal employer audits of magazines. Records revealed that the inspections and audits were not being carried out at this frequency.
 - Dry chemical powder fire extinguishers were provided both inside and outside of the locked gates of the magazine. Personnel were not able to use these extinguishers due to their proximity to the fire. Fire extinguishers were sourced from mobile equipment to fight the fire.
 - There was no water hose provided outside the locked magazine. The water hose inside the magazine could not be utilised when fighting the fire as the smoke had become too intense by the time the gate was unlocked.
 - The area was force ventilated using a compressed air fan. The direction of the ventilation hampered attempts to put out the fire.
- ### Consequences
- Personnel involved in fighting the fire suffered from smoke inhalation. They did not don their self rescuers but were

able to quickly reach fresh air in the main decline after their attempts to extinguish the fire failed.

- The fire and subsequent explosion caused significant damage to services, ventilation doors and machinery up to a kilometre away. Communications were lost underground as a result of damage to the leaky feeder during the explosion. Communications were re-established after half an hour using hand held line-of-sight two way radios, which were brought down the shaft.
- The location of the working party magazine and the siting of force ventilation fans serving an adjacent, blind incline development heading were such that a jumbo operator wearing a self-rescuer had to retreat about one kilometre through smoke towards the entrance to the heading, which was directly opposite the magazine where the fire and subsequent explosion took place. The person was retrieved by the brave action of a fitter who returned underground in a light vehicle and had to pass close by the magazine on two occasions to effect the rescue.

Comment

- The working party magazine concept, historically, was created to provide for local storage of small quantities of explosives and detonators for the use of one airleg miner or a small group working in a particular area.
- With the advent of jumbo development, the quantities stored in working party magazines have generally increased from a nominal quantity of about 100–200 kg up to quantities in excess of one tonne. Where dedicated jumbo development crews and charge up crews are established, the quantities of explosives and

detonators required to serve the multiple areas being developed, can lead (without appropriate controls) to even greater tonnages being stored in a so-called working party magazine. The regulatory provisions, as they were originally developed, did not envisage catering for the levels of usage occurring today.

- A working party magazine should only be utilised to provide small quantities of explosive for an individual or a small work group, and the concept should not be used for the large-scale storage and supply of explosives to service extensive jumbo development or multiple stope face blasting. Large quantities of explosives needed for such working methods should be supplied from a main magazine underground or directly from a surface magazine if this is feasible.

Preventative action

- Mines with reactive sulphide orebodies or stringers should develop a comprehensive management plan to adequately deal with the hazards potentially associated with reactive ground:
 - The geology should be examined on a regular basis to determine the potential for the presence of reactive ground.
 - A geological plan should be maintained identifying areas where sulphides or reactive ground is present.
 - Explosives sensitive to reactive ground should not be used or stored in those areas identified as having reactive ground present. Comprehensive inspections and risk assessments should be completed to affirm that explosive storage areas are free from the presence of sulphide material or reactive ground.



– Specialised inhibited explosives designed for use in reactive ground should be sourced and appropriately used where sulphide material or reactive ground may present a hazard.

– Inspection, monitoring and suppression methods should be implemented to mitigate or remove the potential hazards associated with reactive ground, such as sulphide dust explosions or spontaneous combustion catalysed by extraneous materials such as explosives or fuels.

- A comprehensive procedure for the storage, transport and usage of explosives needs to be developed for each operation, in accordance with legislation, regulatory provisions and applicable standards.
- The statutorily appointed managers who have the daily control and supervision of the mine (Registered Manager and Underground Manager) need to ensure that a system is established to verify that shift inspections are being completed by supervisory staff in all working areas underground, including explosive magazines in accordance with regulations 3.18 and 3.21.
- The statutorily appointed managers who have the daily control and supervision of the mine (Registered Manager and Underground Manager) need to ensure that a system is in place to verify that inspections and audits laid down in company procedures are being completed at the prescribed frequency.
- A procedure to deal with the accumulation and removal of empty ANFO bags or spillage in an explosives magazine needs to be included as part of the storage requirements in any explosives management plan. Prior to removal from the mine once

empty, the ANFO bags should be cleaned and stored outside the magazine and a safe distance from the explosives to reduce the fire risk hazard. All spillage should be cleaned up and removed immediately.

- Procedures should be developed to ensure that no personnel smoke or take contraband (e.g. lighters, matches, mobile phones, radio transmitters) inside the detonator or explosive magazines. This should be reinforced at periodic retraining sessions for personnel with access to explosives.
- A water deluge system and fire hoses should be provided at all storage areas where large quantities of explosives, in particular ANFO, are stored. The activation mechanism for the water deluge system should preferably be automatic or otherwise should be accessible from outside the locked magazine. Fire hoses and water should also be similarly installed outside the entrance to magazines.
- Fire extinguishers need to be placed a safe distance from the explosive storage area so they can be safely utilised in an emergency.
- Working party magazines need to be sited clear of entrances to currently working development headings and their air intakes so that, in the event of a fire, personnel can retreat to safety without being exposed to the hazards potentially arising from a fire or explosion associated with the magazine.
- Back up communications in the form of a direct telephone system underground should be considered in addition to any leaky feeder system. The installation of the back up communication should be such that it is connected via a separate route to avoid both sets of communications being

damaged by a fire or explosion in any one area.

- Personnel need to be adequately trained, retrained and regularly reminded of the importance of donning self-rescuers where a fire is evident underground. Once donned, personnel should not attempt to fight the fire but should immediately evacuate the area and proceed to a fresh-air base or refuge.

Further guidance

The Department has previously issued Safety Bulletin No. 1: Sulphide Dust Explosion Hazard and a Guideline on the Safety Management of Underground Combustible Sulphide Dust, which mine operators should review and implement where a similar hazard is evident. Both documents are available on the Department's website at www.docep.wa.gov.au/ResourcesSafety in the mining section, under guidance material and publications.

Mines should also conform to Australian Standard AS 2187.1:1998 — Explosives Storage Transport and Use — Part 1 in Appendix H, which recommends in part that magazines should be located clear of sources of sulphide dust.

**Mines Safety Bulletin No. 76
Released 20 February 2006**

Use of explosive mortar devices for bringing down rockpass or drawpoint hang-ups

This bulletin is issued as a result of information derived from the initial investigation of a mining fatality in Western Australia. The information is advisory and general in nature, and should not be interpreted as a warning regarding the use of any particular proprietary device or an indicator of

any specific failure in the case of the fatality that gives rise to this bulletin.

The type of device referred to in this bulletin resembles a military mortar in that it consists of a base plate containing a propelling charge, and a tube-barrel, which can be used to fire a finned projectile containing a high-explosive (booster-type) charge with an impact fuse detonator. In the mining application, the propelling charge is of the pyrotechnic or 'black-powder' type, fired remotely using a shock-tube igniter or an electric 'match'.

The unit would be set up and aimed at a target hang-up. The projectile would be fired at the hang-up by detonating the propelling charge. Upon striking the hang-up, the high-explosive charge is fired by the impact fuse device and, hopefully, brings down the hang-up.

It is of crucial importance in attempting to bring down a hang-up by any means that the operation is carried out in a safe fashion and is as free from hazard as may be practicable, given the dangers inherent in the nature of the task and in any use of explosive energy. The results of any failure are, obviously, likely to be serious injury or death and, consequently, precautionary measures to ensure operator safety need to be of the highest quality and rigorously enforced.

Careful consideration needs to be given to the method(s) to be employed to attempt to bring down a hang-up in any given circumstances. Particular methods may not be capable of being safely employed under particular conditions and the method needs to be selected in the light of the circumstances prevailing.

In the use of the type of mortar device covered by this bulletin, a number of special precautions are necessary.

- Only persons specifically trained in the use of mortar devices should be permitted to use them.
- Training should encompass all safety rules and warnings issued by the manufacturer of the device,

as well as the normal methodology and any specific instructions for its use in particular circumstances.

- Discard criteria for the apparatus making up the device itself should be included and emphasised in the training program.
- Prior to use, the equipment must be thoroughly inspected. This would include an examination for damage to the barrel and a check for any built-up material inside the barrel, for example from rust or deposits from previous firings that may cause an obstruction.
- The propelling charge and its initiator must be inserted into the base plate of the device with care and sufficient length of lead wire or nonel shock-tube must be provided to ensure that ignition of the device can be carried out from a safe distance. This distance may well depend on the physical nature and configuration of the area where the device is deployed, and will certainly depend on the size of the high-explosive charge to be used.
- The launch tube or barrel of the device must be fixed to the base plate using a locking pin.
- The entire assembly must be firmly supported at the appropriate firing angle at the launch site and it must be assured that the device cannot slip during firing, particularly due to the reaction thrust during the projectile launching process.
- Any accessories provided by the manufacturer for the safe operation of the device must be employed according to the manufacturer's instructions. This particularly applies to the use of a specially designed 'pusher' plate between the fins of the projectile and the propelling charge to allow the thrust generated by the propelling charge to impinge fully on the projectile.

- The impact detonator fuse unit must be prepared exactly in accordance with the manufacturer's instructions and care must be exercised in its insertion into the projectile. Of particular importance is the use of the correct type and size of impact fuse device and detonator.
- Only high-explosive cast booster charges of the correct size should be used to arm the projectile. The booster cartridge should not protrude significantly from the end of the projectile.
- The projectile must be carefully loaded (with the pusher plate in position) into the launch-tube or barrel.
- Under no circumstances should an armed projectile be forced or hammered into the launch tube.
- Initiation of the propelling charge should take place from a safe distance and the blast area must be barricaded and/or guarded to prevent inadvertent entry.
- Any unnecessary explosives and accessories must be cleared from the firing area prior to initiation of the propelling charge.
- Blasting fumes and dust must be allowed to clear before re-entry to examine the results of the use of the device.
- Any failure of either the propelling charge or the high-explosive charge must be treated as a misfire.
- Following a successful application of the device, both the launch-tube barrel and the base plate must be checked for damage by either the explosives employed or by falling rock dislodged from the hang-up.
- If the launch tube barrel is damaged or dented such that a new (unarmed) projectile cannot be freely inserted and passed through the full length of the tube, it must be discarded and replaced by a new tube prior to re-use of the unit.



Where a launching device has been successfully employed to bring down a hang-up, it must be recognised that damage can be sustained to the barrel and/or the base plate. Careful examination must be undertaken to ensure that no blast or falling-rock damage has taken place and particularly that the launch tube has not suffered any dents or distortion that may impede the free passage of a projectile.

Significant Incident Report No. 136
Released 2 March 2006

Caught between headboards of two trucks — fatal accident

Incident

A contractor site manager was standing on the deck of a haul truck adjacent to the handrail. The haul truck had broken down and he was guiding a second haul truck into position to jump-start the out-of-service truck. As he was giving hand signals to the truck driver, his head was caught between the headboards of the two trucks.

Causes

The immediate cause of the accident was failure to take up a safe position for guiding the truck.

Comment

There were three vehicles parked near the work area and at least one was in a position that impeded the direct line of approach of the moving truck.

Although jump-starting of haul trucks is relatively common practice on some open pit mines, other methods of work are available. Examples are the use of starter units fixed to service vehicles and transportable battery carts.

Recommendations

Mine managers should review their site procedures for 'spotting' haul trucks and other large vehicles. In general terms, a safe location should be selected for the spotter. This would commonly be a position on the ground, in direct line-of-sight of the driver where the spotter could not be trapped or run over. Clear and consistent hand signals or radio contact should be established.

Mine managers should review their procedures for parking vehicles in

the vicinity of haul trucks and other large earthmoving vehicles. Clear access should be maintained for maintenance and service equipment. The limited visibility from the driver's cabin should be considered and the risk of driving over an employee or other vehicles addressed.

Mine managers should also review their practices for jump-starting large earthmoving vehicles and consider the use of dedicated service vehicles equipped with battery packs, or the use of mobile battery carts.

Public comment sought

Dangerous Goods Safety Legislation

A comprehensive package of updated Dangerous Goods Safety legislation is available for public comment for a six-week period.

The draft regulations and supporting materials will be available from 9 am WST, Monday, 27 March 2006 for public comment.

The package can be obtained:

- by phoning the Resources Safety Infoline on 1300 855 685 and recording your contact details; or
- from the Resources Safety website at www.docep.wa.gov.au/ResourcesSafety.

Comments must be submitted in writing to:

- Resources Safety
Department of Consumer and Employment Protection
Locked Bag 14, Cloisters Square WA 6850;
- fax (08) 9222 3525; or
- email ResourcesSafety@docep.wa.gov.au

All public comment must be received by 5 pm WST, Monday 8 May 2006.